CLAIMS

1. A TM010 mode resonator device comprising:

a dielectric substrate;

electrodes formed on both surfaces of the dielectric substrate, at least one of the electrodes being a circular electrode; and

a plurality of through holes passing through the dielectric substrate and formed around the circular electrode in the dielectric substrate, the inside of each through hole having no electrode as no electrode-formed portion,

wherein an open-circuited end for improving confinement of an electromagnetic field is provided around the circular electrode by using the plurality of through holes.

2. A TM010 mode resonator device as claimed in claim 1, wherein, when the wavelength of a resonance frequency in the dielectric substrate is represented by λg, the space between neighboring through holes is set to be $\lambda g/4$ or less.

3. A TM010 mode resonator device comprising:

a dielectric substrate;

electrodes formed on both surfaces of the dielectric substrate, at least one of the electrodes being a circular electrode; and

a plurality of strip electrodes disposed so as to radially extend around the circular electrodes formed on both surfaces or the circular electrode formed on one surface of the dielectric substrate so as to have a space between the circular electrodes or the circular electrode and the plurality of strip electrodes.

4. A TM010 mode resonator device as claimed in claim 3, wherein, when the wavelength of a resonance frequency in the dielectric substrate is represented by λg, the length of the radially extending strip electrodes is $\lambda g/4$ and the strip electrode is

rectangular in shape.

5. A TM010 mode resonator device as claimed in claim 3 or 4, wherein the space between neighboring strip electrodes is set to be $\lambda g/4$ or less.

6. An oscillator device using a TM010 mode resonator device as claimed in any one of claims 1 to 5.

7. A transmission and reception device using a TM010 mode resonator device as claimed in any one of claims 1 to 5.